

The logo for the 2024 Embedded VISION Summit is centered on the left side of the slide. It features a white octagonal background with a colorful, multi-layered border in shades of purple, blue, green, yellow, and orange. The text "2024" is at the top, "embedded" is below it, "VISION" is in large, bold, dark blue letters with a gradient, and "SUMMIT" is at the bottom in a smaller, dark blue font.

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Silicon Slip-Ups: The Ten Most Common Errors Processor Suppliers Make (Number Four Will Amaze You!)

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Here's Me, Opening Up a New Embedded Dev Kit!



A Few Words About BDTI

- Engineering consulting company focused on embedded AI and vision
- Founded 32 years ago — we've seen a thing or two

Technology Suppliers

- Processor evaluation
- Tools evaluation
- Usability analysis/evaluation
- Competitive analysis
- Reports and white papers
- Technology strategy consulting

Systems Companies

- System requirements, specs
- Algorithm design
- Processor selection
- Software development
- ...

My Three Goals With This Talk

1

If you work for a **semiconductor** vendor...

Please don't make these mistakes (either "ever" or "ever again" 😊).

2

If you're **selecting** a **processor** to use in your product...

Please think about these things during your selection process.

3

If you're **either** of the above...

BDTI can probably be of some help. (So this is crazy, but call us, maybe?)

Slip-Up #1: Not Answering “Why Would I Use This?”

For example ...

- Your company has a new processor ...
 - But no benchmarks ... or crappy benchmarks
- Your company has a new tool suite or deep-learning framework ...
 - But no clear statement of what it does better than anyone else’s does
 - Or such a statement, but no proof, explanation, or example



Why? Why would I use this?

Slip-Up #3: Incomplete (Or No) Model Zoo

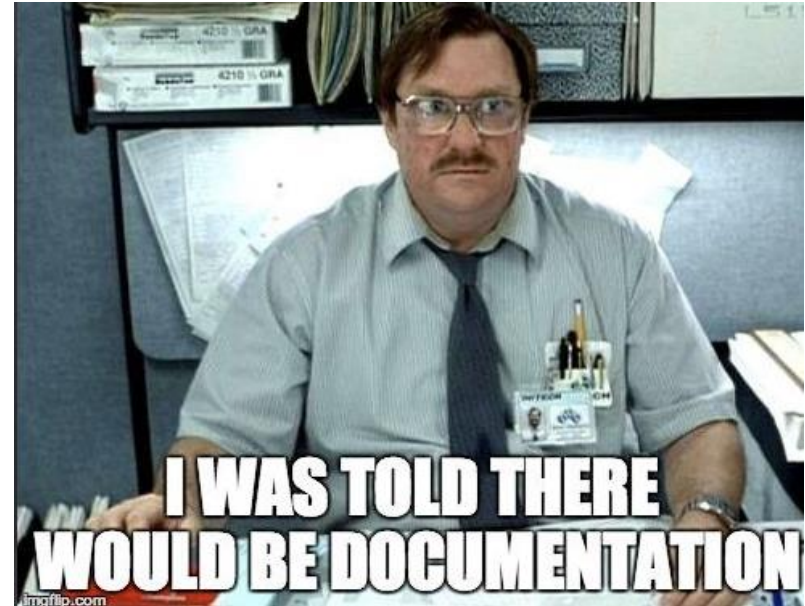
- Your customers want to run AI models on your processor.
- **Please, help them:** Give them a model zoo.
- I know: Every day brings new models, and you can't keep up.
- But you know what? There are a lot of workhorse models out there (e.g., MobileNet, YOLOv5, YOLOv8).
- It's amazing how many processor vendors don't have these models implemented and optimized on their chips.



Tough choices
(Meme courtesy ChatGPT... srsly.)

Slip-Up #4: Missing, Poor, or Out of Date Documentation

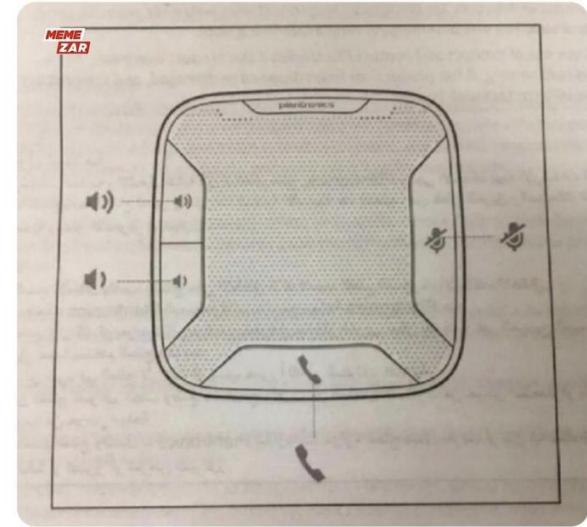
- One of the downsides of working at the cutting edge is ... sometimes you get cut
- One of the ways this happens is lack of documentation, or incorrect documentation, or out of date documentation
- This is particularly troublesome when the features being used are new, and key to your design
 - E.g., new NPU, new ISP, ...



Slip-Up #5: Too Much (or Unhelpful) Documentation!

- You might think I'm whining now, given the last slide
- (You might be right.)
- But consider two examples:
 - Datasheet for a recent processor
 - Or three conflicting manuals for new processor AI/ML tools

Don't know what I'd do without this manual, was well worth the read 🙏



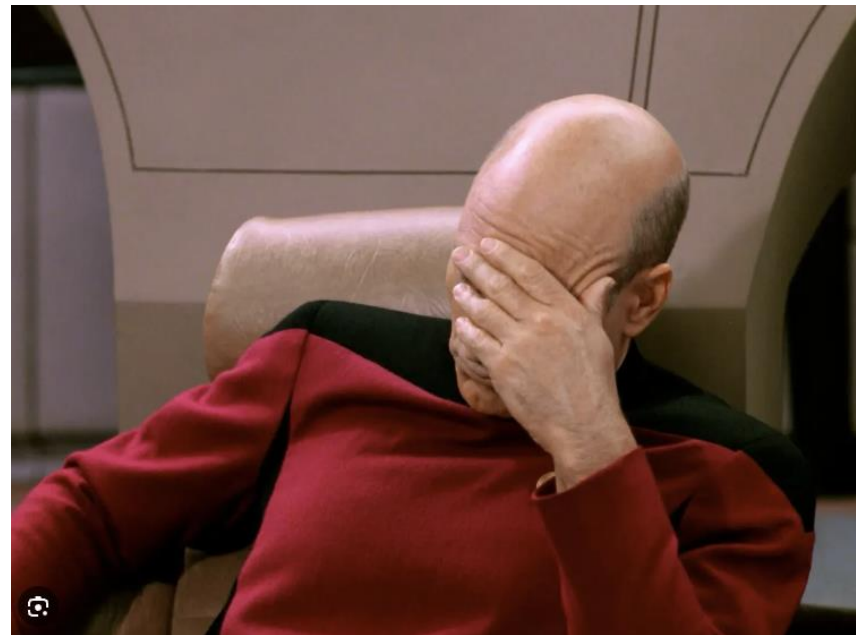
Slip-Up #6: No Getting Started Guide or “Hello World”

- How do I quickly get going using your new processor or tool?
- For computer vision, by “Hello world” I don’t mean `printf(“Hello world\n”)` but rather some typical AI/ML flow, e.g.:
 - Take in an image
 - Do some pre-processing on it
 - Run inference on it
 - Annotate output
 - Display it



Slip-Up #7: No Source Code ... Especially for Drivers

- Yay! That new processor is swell. Documentation is great! It has a hello world program! Great model zoo!
- It even runs Linux or Android!
- But ... there's no source code for ...
 - The ISP
 - The NPU
 - The GPU
 - That special peripheral that is key to your design



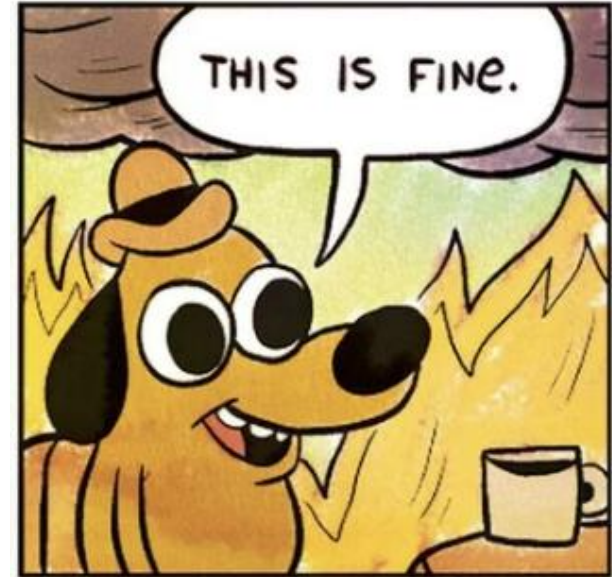
Slip-Up #8: Accelerators That Don't

- Yay! The new chip has an awesome integrated GPU or NPU!
- But ...
 - Its memory is too small to fit the models you care about... or ...
 - It doesn't support the ops your network needs... or ...
 - It only runs 4-bit quantized models ... or ...
- For whatever other reason, the accelerator performance ends up being way less than you'd hope for



Slip-Up #9: Unsupported External Peripherals

- Often happens with cameras
 - “We offer out-of-the-box support for the Sony IMX123 and IMX456 image sensors!”
 - That’s great, but those aren’t the sensors I need in my application
 - “We support MIPI CSI-2!”
 - But only two lanes, and our dev kit didn’t bring out all the pins anyway...



Slip-Up #10: Software Upgrades That Break Things

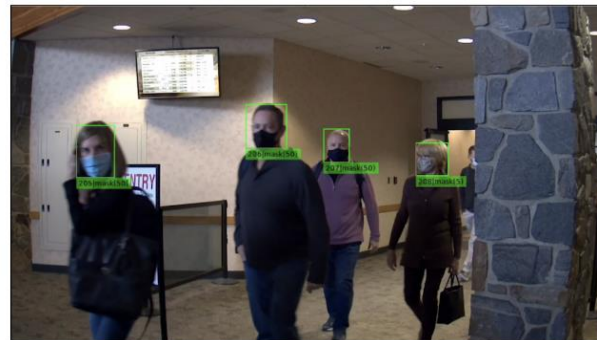
- “Oh, look, the vendor just released a new software update.”
- “Should I install it? Mmm. Could be dangerous. On the other hand, it has that key feature I need for my project, that they’ve been promising.”
- “Ah well. It’s a dot-release, how bad could it be?”
- (Famous last words.)



My project, post-upgrade

A Success Story: NVIDIA Jetson Nano

- We did a fun project for NVIDIA during the pandemic.
- They hired us to build a real-world product with the Jetson Nano, and let them watch.
- The result was MaskCam, a smart camera that can detect the portion of people in its field of view wearing facemasks.
- Immensely valuable for their product team: they got to see, up close, how people actually used their documentation, tools, and hardware.
- Resulted in some nice marketing for them.



- Thanks for listening to me rant, I feel better now. :-)
- More seriously:
 - Semiconductor vendors, we know it's hard making SoCs and software tools. They're immensely complicated. Hopefully these slipups give your engineers and product managers food for thought.
 - Systems companies, we know it's hard choosing a processor. Hopefully these give you, too, something to think about.
 - Both of you: please let us know if we can help.
- Thank you!

BDTI Web Site

bdti.com

MaskCam Jetson Nano Report

bit.ly/bdti-maskcam

2024 Embedded Vision Summit

Come visit us in booth 610.

(We promise not to rant too much.)